

Organisational capabilities and internationalisation of the small and medium-sized information and communications technology firms

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Abstract Especially in changing and unpredictable global environments where small knowledge-intensive information and communications technology (ICT) firms often operate, knowledge-based organisational capabilities are seen to contribute most to the performance. In this paper we explore the internationalisation process of small knowledge-intensive firms by studying the effects of a firm's organisational capabilities on internationalisation and performance. We use a sample of 124 (of which 55 operate internationally) Finnish small and medium-sized firms. International experience is confirmed to be a significant determinant of internationalisation and international performance. In addition, financial capabilities prove to be a significant indicator of the degree of internationalisation: excellent investment expertise, connections with venture capitalists and good financial management are important capabilities for a small firm with high international growth aspirations.

Keywords Organisational capabilities · Internationalisation · SMEs · ICT · Performance · Knowledge-based view

Introduction

As more and more small and medium-sized enterprises (SMEs) become international nowadays (and some of them very rapidly i.e., they are so-called born globals) there

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is a growing interest in theoretical frameworks through which this process can be described and analysed. It is clear that operating on highly competitive international markets demands specialised resources, skills and capabilities. Unfortunately, these internationalisation facilitating resources/capabilities tend to be scarce or even non-existent in many small firms. They often lack financial resources to build up advanced technologies to produce superior products for highly competitive international markets. In addition, the lack of experienced and skilful workforce often badly obstructs internationalisation both in manufacturing, and marketing as well as in persuading potential financiers. In order to overcome these problems, many internationalising SMEs do not follow traditional incremental internationalisation models (see e.g., Bell 1995; Knight and Cavusgil 1996, 2004; Moen and Servais 2002; Sapienza et al. 2006; Gabrielsson and Pelkonen 2008). In the information and communication technologies (ICT) industry this phenomenon is quite evident and we will focus on it in our empirical part (on related results, see Saarenketo et al. 2004 and Saarenketo et al. 2008).

Especially in dynamic, i.e., changing and unpredictable environments, the knowledge-based resources are seen to contribute most to the performance (Autio et al. 2000; Fernhaber and McDougall-Covin 2009; Filatotchev et al. 2009). Following this lead, we explore the internationalisation process of ICT SMEs from the widely interpreted knowledge-based perspective. The so-called knowledge-based view (KBV, see Grant 1996; Spender and Grant 1996) of the firm can be seen as an extension to the resource-based view (RBV) of the firm (e.g., Wernerfelt 1984; Barney 1986) which in turn has its roots in the theory of the firm (Penrose 1959). According to the RBV the resources or capabilities that contribute to sustainable competitive advantage should be valuable, rare, inimitable and nonsubstitutable (Barney 1991). Amit and Schoemaker (1993) refer to *capabilities* as the capacity of a firm to effectively and efficiently use resources to produce different products and services.

The main goal of this article is to study the effects of internal organisational capabilities, especially financial, management, marketing, and technical capabilities, on internationalisation, i.e., to test if they could explain the internationalisation and performance of small knowledge-intensive firms like the ones operating in the ICT domain. First, we will look at the existing studies related to internationalisation and knowledge-based SMEs. Second, our theoretical framework will be introduced and our hypotheses will be derived. Third, the hypotheses will be empirically tested by means of an Internet-based survey of Finnish SMEs from the ICT sector. The final section of the paper includes conclusions and implications for studies of internationalisation of small knowledge-intensive firms, and also provides managerial guidelines and suggestions for future research directions.

Internationalisation of small and medium-sized knowledge-intensive firms

Internationalisation has been defined as “the process of increasing involvement in international operations” (Welch and Luostarinen 1988, p. 36). The last few decades have seen an increasing trend in the internationalisation of SMEs. The growth in numbers in SME internationalisation is facilitated by some structural changes in

world markets, technologies, institutional constraints, and consumers' preferences. They include e.g., the deregulation and liberalisation of financial (and other) markets, the rise of modern communication and transportation technologies, the increasing importance of science as a basis of R&D, and the globalisation of both businesses and individual consumers (see e.g., Oviatt and McDougall 1995; Knight 2001; Buckley 2009).

There are several behavioural based *stage models of internationalisation* (e.g., Johanson and Vahlne 1977; Bilkey and Tesar 1977) through which internationalisation process used to be studied. Most of these models posit that firms commit greater resources to international markets gradually. However, recently there has been more evidence of and research on internationalisation of SMEs, and many service or knowledge-intensive firms seem not to follow the incremental internationalisation patterns (see e.g., Knight and Cavusgil 2004). Several concepts have been used to describe the firms which "leapfrog global"; these include e.g., *born globals* (see Rennie 1993; Knight and Cavusgil 1996; Saarenketo et al. 2004) and *international new ventures* (Oviatt and McDougall 1997; Fernhaber and McDougall-Covin 2009). There seems to be a consensus among the researchers that none of the internationalisation theories can alone explain the dynamics of the internationalisation of small, knowledge-intensive firms (see e.g., Coviello and McAuley 1999). Jones (1998) has noticed that internationalisation, at the early stages of a firm's life, is less of a functional activity than a direct process of growth and development. This means that there is room for the more strategic approaches to the studies related to internationalisation of knowledge-intensive SMEs. Autio et al. (2000) suggest that "knowledge intensity reflects the extent to which a firm depends on the knowledge inherent in its activities and outputs as a source of competitive advantage". Knowledge creation and the use of knowledge have been seen as especially noticeable in high-technology sectors (see e.g., Eisenhardt and Schoonhoven 1990), and research and development (R&D) is often seen as an indicator of knowledge intensity (see e.g., Kuivalainen et al. 2004).

Some authors have used the RBV as a "meta theory" behind internationalisation or the choice of the international growth strategy (see e.g., Andersen and Kheam 1998; Peng 2001). This use is supported through the shared, common theoretical assumptions. For example, although it is not often explicitly stated, the stages model of internationalisation rests on the RBV. The core explanation of the stages model is based on the increase in market-based knowledge, whereas the classification of this knowledge is based on Penrosian tradition (see also Augier and Teece 2007). The RBV argues that the resources and capabilities a firm possesses should define the essence of the firm's strategy (Rumelt 1984; Andersen and Kheam 1998; Blomqvist et al. 2002; Jantunen et al. 2005; Prashantham 2005). The main problem of using the RBV as a "meta theory" behind internationalisation relates to its static nature that does not allow explaining how the resources can be created, used, reconfigured, and shared over time within the firm and between partner and rival firms during the internationalisation process.

In our view, the knowledge-based view of the firm (KBV), while accepting much of the content of the RBV, pays more attention to the dynamic processes by which the specific (especially knowledge related) capabilities evolve and develop. Therefore, it also comes close to the more general evolutionary view of the growth

of the firm (Nelson and Winter 1982; Kyläheiko 1998; Augier and Teece 2007). From this perspective the basic ideas of the KBV also broadly overlap with the so-called dynamic capabilities view, DCV, (see e.g., Teece et al. 1997; Teece 2007; Jantunen et al. 2005). Both approaches focus on creating, transferring, using, protecting, and sharing bits of knowledge, resources and capabilities as sources of (sustainable) competitive advantage in dynamic environments. In what follows we will use the concept KBV, although the terms KBV and DCV could be used interchangeably. We prefer the concept of the KBV, since we think that the most important single resources, routines and capabilities especially in high tech ICT industry are more or less knowledge related. However, it is important to notice that the boundaries between the concepts of resources, capabilities and skills are not quite clear (see e.g., Amit and Schoemaker 1993; Andersen and Kheam 1998; Teece et al. 1997). Also in practice to exactly measure what a knowledge-based resource or capability is and what type of value it provides to its possessor is often context specific and hard.

Although some confusion regarding the concept exists we can, however, note that in general there are two types of organisational knowledge, i.e., hard to protect but easy to transfer “information” and more or less tacit “know-how”, which is embedded in personnel and hence, hard to transfer but easy to protect (see e.g., Kogut and Zander 1993; Jantunen et al. 2005). Wilkins et al. (1997) see knowledge assets consisting of “facts, assumptions and heuristics which provide economic value to their possessor”. Following Grant (1996), it is enough for us to acknowledge that there are many types of knowledge that are relevant to a firm. Following the lead of Teece (1998) we refer to intangible assets, resources, capabilities and competencies as knowledge assets. These knowledge assets are capabilities that can evolve over the time.

The notion of the evolution of knowledge-based capabilities through time originates from evolutionary economics (e.g., Nelson and Winter 1982; Blomqvist et al. 2002; Jantunen et al. 2005; Ripollés-Meliá et al. 2007; Wright et al. 2008; Saarenketo et al. 2009.). Here the starting point is the famous triad of evolution “variation–retention–selection” introduced by Campbell already in the late 1950s. The role of entrepreneurs is to generate Schumpeterian “new combinations”, whereas replication will be realised by means of continuously using existing skills, routines, and capabilities and by means of learning i.e., partial replication. The selection will mainly be organised by competitive forces. An important concept here is *partial replication* in creation of knowledge, i.e., the capabilities are seen to develop over time through partial replication of the processes of the firm. Partial replication results in learning that can be seen as a key element for long-term competitive advantage (Kyläheiko 1998; Blomqvist et al. 2002; Jantunen et al. 2005; Adenfelt and Lagerström 2006). The firms that are able to learn and in addition to innovate by creating new bits of knowledge continuously should also be able to sustain their competitive advantage embedded in capabilities and routines. Here, of course, the Schumpeterian view of entrepreneurs as agents who can create “new combinations” based on existing resources and capabilities is of great importance. As Augier and Teece (2007) state, Penrosian views (1959) were consistent with this view when stating that the growth of the firm rests on the management’s capability to look at existing technologies, markets and business models from different perspectives.

Knowledge-based view of internationalisation

Several factors have been hypothesised to affect internationalisation. These include for example, internal organisational and external institutional (e.g., regulations) as well as Porterian competitive forces-related factors (Brush and Vanderwerf 1992; Fernhaber and McDougall-Covin 2009; Saarenketo et al. 2008, 2009). In our view, the competitive advantage of the knowledge-intensive firm and hence, the basic motive behind internationalisation is based on the firm's knowledge-related organisational resources and capabilities. The presence of certain types of resources and capabilities can trigger the internationalisation of the firm or change its pattern. In earlier studies, the knowledge intensity of the firm's capabilities has been found to be a regulator of the internationalisation strategies or patterns of technology intensive small firms (e.g., Autio et al. 2000; Crick and Jones 2000; Jones and Coviello 2005; Prashantham 2005). In international business, knowledge can also provide particular advantages to facilitate foreign market entry. Kogut and Zander (1993) pointed out that transferability of the knowledge and the ability to develop new knowledge are among the key issues in the entry mode choice, not the costs and current existing capabilities.

There is also a consensus among researchers that as SMEs tend to have fewer resources to internationalise than their larger counterparts, they should have superior (tacit) knowledge about global opportunities and superior capabilities to leverage them in order to possess the competitive advantage and overcome entry barriers (Liesch and Knight 1999; Fahy 2002; Fernhaber and McDougall-Covin 2009). Tacit, idiosyncratic knowledge base within the firm increases the level of organisational capabilities and they can be acquired by different pathways (e.g. Nelson and Winter 1982; Nonaka 1994; Teece et al. 1997; Blomqvist et al. 2002; Saarenketo et al. 2004). Andersen and Kheam (1998; see also a recent study of Wright et al. 2008) argue that management's perception of capabilities is a more relevant means in an international strategy formulation process than existing capabilities, and we follow this line. This view is highlighted also by Teece (2007) who regards sensing weak signals and ability to seize the opportunities as the main drivers of the DCV.

International experience and its role in capability development and subsequent internationalisation

When observed through the lenses of the KBV or DCV, international expansion and the related internationalisation processes appear to be most easily understood in terms of a firm's progressive accumulation of knowledge (Knudsen and Madsen 2002). Learning about and from internationalisation is a cumulative process, in which all the steps or activities in international markets increase the experimental knowledge of a firm (Johanson and Vahlne 1977, 1990; Saarenketo et al. 2008). The implications of the firm's learning process are that the past contributes to its current knowledge base and being international increases the knowledge regarding process of internationalisation and international market knowledge, for example.

A key concept to understand the development of the firm's capabilities development and internationalisation patterns is the so-called *absorptive capacity* (Cohen and Levinthal 1990), i.e., the capability to recognise, assimilate and apply

information to use. Absorptive capacity can also be acquired through partial replication, for example. By operating in international environments and conducting business operations in various locations a firm, in order to be successful, must be able to develop its knowledge transfer skills and make use of this knowledge. Another aspect of capability development stems from the fact that internationalisation can be seen as an entrepreneurial activity per se (Zahra and George 2002; McNaughton 2003): those firms which have internationalised can be seen as entrepreneurs who can create “new combinations” from the gained experience and develop their pool of capabilities. Consequently, if a firm is able to operate successfully in international markets, the international experience it has gained should also develop the firm’s other capabilities (see e.g., Saarenketo et al. 2004).

Our intensive search revealed that there are various classifications of different resources and capabilities, and measurement scales presented in the literature. For example, Spanos and Lioukas (2001) divide capabilities into technical, marketing and organisational ones. In this area however, the empirical research on knowledge-based capabilities has not yet reached maturity (see e.g., McEvily and Chakravarthy 2002), and our research can partly be seen as explorative regarding to the linkages between capabilities and other constructs. A classification of functional organisational capabilities of the firm including technology, marketing and management (i.e., organisational capabilities such as management practises and resources) and financial capabilities is used in our analysis. All these capabilities can be seen as important for the firm’s development (regarding technical capabilities, see e.g., Jantunen et al. 2005, for marketing Zahra et al. 2000, for managerial capabilities Augier and Teece 2007, and for financial capabilities Westhead et al. 2001). The characteristics of these various capabilities are presented in detail in the latter part of the paper. Here we argue, however, that because of cumulative knowledge and experience through learning there should be a difference between international and domestic firms in their perceived level of capabilities and between those firms which are more international and those which are less. Hence, the following hypothesis and its four sub-hypotheses are proposed:

H1: International experience has a positive effect on capabilities

H1a: International experience has a positive effect on financial capabilities

H1b: International experience has a positive effect on managerial/organisational capabilities

H1c: International experience has a positive effect on technical capabilities

H1d: International experience has a positive effect on marketing capabilities

International experience is also a key determinant of future internationalisation (cf. e.g., Johanson and Vahlne 1977, 1990). The experience and degree of commitment to internationalisation (which can be seen as internationalisation capabilities) manifest themselves through a firm’s internationalisation strategy. Correspondingly, the capability of the firm to engage itself more in international operations is often measured through the experience and commitment of the firm in international operations (e.g., measured through countries served, years of international operation, and operation modes used, see examples of different measures, e.g., in Lu and Beamish 2001; Eriksson et al. 2000; Wright et al. 2007). We have to be cautious regarding the measures, however, as similar measures can

also be used to define a firm's internationalisation strategy (see e.g., Tallman and Li 1996 for the scale and scope of internationalisation), international performance and the extent of firms' internationalisation, often labelled as the degree of internationalisation (DOI, see e.g., Sullivan 1994). DOI of the firm can be described as a snapshot of the firm's situation at a specific moment of time. By studying a firm's DOI at certain time sequences and events which occur at specific points in time, we can study the internationalisation behaviour of the firm, or in other words, its internationalisation process or strategy. Hence, as we study both the past international experience and the effect of this on the subsequent internationalisation (in the form of the DOI and performance), different measures have to be used for different constructs.

As in the development of all capabilities, the internationalisation skills are *path dependent* (see e.g., Eriksson et al. 2000) and develop through partial replication. Again, the implications of the firm's learning process are that the past contributes to its current knowledge base and being international increases knowledge regarding the process of internationalisation and international market knowledge and subsequently, the firm's DOI. This is of importance as DOI brings with it environmental complexity and increased competition. McDougall and Oviatt (1996, p. 27), for example, note that DOI "is an important environmental contingency... in addition to increased logistical costs, entrepreneurs and managers may need to learn something about foreign laws, language, culture, and competitors". As pointed out earlier, SMEs, which tend to have fewer resources to internationalise than their larger counterparts, should have superior (tacit) knowledge about global opportunities and superior capabilities to leverage them in order to possess the competitive advantage and overcome entry barriers (Liesch and Knight 1999; Fahy 2002; Fernhaber and McDougall-Covin 2009). Experimental knowledge is also seen as an antecedent of international performance (see e.g., Katsikeas et al. 2000). Hence, the following hypothesis is proposed:

H2: International experience has a positive effect on a) degree of internationalisation (DOI) and b) international performance

Internal organisational capabilities and their relationships to internationalisation

Knowledge and expertise in different functional competencies have been found to be positively related to international growth and performance (e.g., Cavusgil and Zou 1994; Kogut and Zander 1993; Prashantham 2005; Sapienza et al. 2006). Previously outlined classification of financial, managerial, technical capabilities and the relationships between these capabilities and internationalisation of the ICT SMEs are presented next:

Financial capabilities: smaller firms tend to have fewer financial resources and have more difficulties in obtaining the necessary funds for research and development, marketing, exporting and internationalisation in general (see e.g., Lee et al. 2001; Westhead et al. 2001; Sapienza et al. 2006). Often this is a question of inability to manage to persuade the venture capitalists and other potential financiers. However, greater financial resources invested during the early stages of the firm's growth into a start-up or a small firm often mean that the firm is better able

to invest more financial resources to its own operations; such a firm is likely to accumulate larger stock of capabilities (embedded in personnel) than its competitors. Consequently, a firm's ability to obtain financial resources (i.e., money) and to manage and use these resources efficiently may enable the firm to secure new markets and operate successfully in them. The financial resources (i.e., monetary resources) are not however, available if there are no financial capabilities (i.e., connections to different types of investors, for example) which are needed to acquire and manage them. From this perspective, it is easy to understand that the ability to successfully persuade venture capitalists and other investors really is such a critical capability that has the VRIN attributes. Financial capabilities in the SME context have been studied through different types of measures, including e.g., investments made in the firm in a certain time period (Westhead et al. 2001). Lee et al. (2001) suggested that having linkages within the venture capitalists is an important indicator of performance (see also Coviello and Cox 2006). Lockett et al. (2008) also point out that there is a relationship between value add venture capital investments and export intensity. Consequently, financial capabilities should have a positive effect on DOI and international performance.

Organisational/Managerial capabilities: according to Teece et al. (1997) and Augier and Teece (2007) organisational/managerial capabilities include e.g., managerial competencies related to organisational and managerial processes, knowledge and skills of employees, and an efficient organisational structure. In an international context there is a need to manage, transfer, reconfigure and acquire knowledge within a firm across national and firm boundaries, and choose a suitable operation mode to support this. Managerial capability, i.e., the role of the management experience and an ability to manage the firm's operations has been emphasised in many studies related to performance (Eisenhardt and Schoonhoven 1990; Autio et al. 2000). Autio et al. (2000) notice that knowledge-intensive firms focusing on knowledge creation and exploitation as the source of competitive advantage are more likely to develop learning skills that are useful for adaptation to new market environments. Entrepreneurial abilities come very close to this extended view of managerial capabilities (Jantunen et al. 2005; Wright et al. 2008; on critique, see Wright et al. 2007) and they can be seen having a positive effect on internationalisation and international performance.

Technical (or technological) capabilities are among the most recognised determinants of success in small knowledge-intensive firms (McGrath 1994; Zahra 1996; Jantunen et al. 2005). Emphasis on new technology development is a natural routine for innovative, entrepreneurial firms (Nelson and Winter 1982; Knight and Cavusgil 2004; Filatotchev et al. 2009; Saarenketo et al. 2009). Technology can be seen as a sum of a firm's knowledge and skills, which determine the ability of technology-based ventures to offer products and services, gain market acceptance, survive at the market and achieve financial success (Zahra and Bogner 1999). In our empirical sample, it is evident that technical skills and superior product/service are a necessity for a firm to gain superior international performance.

Marketing capabilities, for example, the ability to learn customer needs and position their product successfully, (see e.g., Zahra et al. 2000; Brettel et al. 2009) can be seen as significant determinants of success even for technology-based small firms. Technical skills are often not enough. McGrath et al. (1995) notice that a new

firm must learn other skills. For example, existing knowledge related to the market is seen as an important skill, as in many cases small firms follow focus/niche type strategies with an aim to service chosen market segment needs. Wolff and Pett (2000) argue that customer service and high quality marketing strategies need a much narrower resource base than e.g., brand strategy, and are then more possible for SMEs. Internationalisation is a market penetration strategy, and thus, it can be assumed that a firm planning to grow successfully through internationalisation has to possess marketing capabilities above average.

Thus, the theory postulates that internal capabilities and market opportunities made available by different capabilities (to which a firm responds with a certain type of internationalisation strategy) determine the direction of a firm's growth (see e.g., Andersen and Kheam 1998), the outcome of which is the DOI of internationalisation and subsequent international performance. Leonidou et al. (2002) notice that there appears to be a strong association between export marketing strategy and export performance measures,¹ for example. Hence, the following hypothesis and its four sub-hypotheses are proposed:

- H3: Capabilities have a positive effect on degree of internationalisation (DOI) and international performance
- H3a: Financial capabilities have a positive effect on degree of internationalisation (DOI) and international performance
- H3b: Managerial/organisational capabilities have a positive effect on degree of internationalisation (DOI) and international performance
- H3c: Technical capabilities have a positive effect on degree of internationalisation (DOI) and international performance
- H3d: Marketing capabilities have a positive effect on degree of internationalisation (DOI) and international performance

To sum up, based on the discussion above, we argue that there is a causal relationship between international experience, internal capabilities, and internationalisation and international performance (see Fig. 1).

Data and methodology

Collection and description of the data

Since the firms of interest were defined as small and medium-sized Finnish firms providing value added services in the ICT sector, an Internet survey was considered an easy and fast way for the firm managers to participate in the survey. The target

¹ The majority of empirical studies use subjective perceptual measures of international/export performance (Leonidou et al. 2002). Traditional performance measures include financial goals (profit-related, sales-related and market share related). Depending on measurement purposes, also non-financial subjective measures have been used (such as managers' satisfaction with fulfilment of export objectives). In this study performance is measured with subjective performance measures. However, our degree of internationalisation (DOI) measure can also be seen as equivalent to both objective performance measure used in many studies and as an outcome of internationalisation strategy as it touches upon export intensity (foreign sales to total sales) and number of target markets, for example.

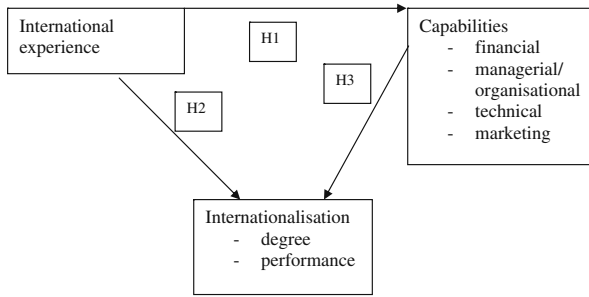


Fig. 1 Tested hypothesised links between experience, capabilities, and internationalisation

population included content providers and software providers for service platform and management systems. Due to the rapid development of the ICT sector and the unsuitability of standard industry classification codes, there was no single up-to-date sampling frame available for the purposes of the study. Therefore, the names and contact information of the firms were searched from multiple sources, e.g., Kompass Finland Database, The Statistical Bureau of Finland database of Finnish firms, Internet sites of the firms themselves, incubators, venture capitalists, and industry organisations.

The sample covered 493 firms. They were at first contacted by telephone. The 386 firms which were found suitable and which agreed to participate were sent e-mails with instructions and the URL address for the questionnaire. A reminder message was sent to those who had not returned their answer within 2 weeks. One hundred twenty-four firms returned their answers, and the effective response rate was 31.2% (124/386). The response rate can be considered adequate as the questionnaire was rather extensive and the respondents were mainly managing directors with busy time schedules.

The validity and reliability of the results were secured by several means. For example, the questionnaire was carefully pretested in a number of firms. Furthermore, the questionnaire was targeted to managing directors who are considered to be the most knowledgeable informants regarding internationalisation issues in SMEs. Comparison of early and late was conducted to assess nonresponse bias (cf. Armstrong and Overton 1977). No significant differences were found between these two groups. Table 1 provides descriptive information of the respondent firms. The firms were established between 1954 and 2001, but the median value of the establishment year was 1996 indicating that the firms participating in the present study were actually quite young. On average, the

Table 1 Descriptive information of the respondent firms

	Mean	Median	Standard deviation	Minimum	Maximum
Turnover in 2001 (million €)	2.91	0.47	9.15	0	84.09
Establishment year	1994.3	1996	6.75	1954	2001
Fulltime employees in 2001	29.9	10	76.01	0	720
Start year of international operations	1997.3	1998	3.76	1984	2001

turnover of the firms was 2.91 million euros, and the median value for the turnover indicates that in 50% of the firms the turnover was equal to or less than 0.47 million euros. Fifty-five firms (44%) had international operations. The average length of international experience of these firms was only 3 to 4 years. All major sectors of the software industry were represented in the study: 67% of the firms were selling software products, while 49% customised their software for each client and 12% produced software embedded in different devices. Additionally, 43% of the firms also included training and consulting as part of their offering.

Measurement

The measured constructs used in the paper include firms' organisational capabilities, degree of internationalisation, experience of international operations and international performance. Measures for core organisational capabilities are purely summated scales formed from the statements included in the survey. As written above, the key idea behind the statements (which were measured with Likert scale items, 1 = completely disagree, 5 = completely agree) was to uncover managers' perceptions of the firm level capabilities in comparison to their competitors as they should be relevant for international strategy formulation (see e.g., Andersen and Kheam 1998). The statements focused on the strength of intangible and tacit knowledge a firm possesses related to each organisational function. Regarding marketing capabilities, for example, the items measured relationships between the firm and its clients, strength of the connections between the firm and its retailers/suppliers, the amount of market information acquired and strength of the brand. Regarding financial capabilities our measure included statements related to investor connections and expertise (as relationships with venture capitalist are seen as important indicators of performance, see e.g., Lee et al. 2001) and financial control. These statements were in many cases adapted from previous studies (see e.g., Spanos and Lioukas 2001 and their scales focusing on marketing, technical and organisational/managerial assets and e.g., Andersen and Kheam 1998 regarding technical capabilities); some of the items were developed by ourselves based on the ideas found from the extant literature (cf. e.g., Teece et al. 1997 regarding managerial capabilities). The reliability of the scales was assessed, and factor analysis was applied to confirm the scales (see Appendix 1). Principal component analysis with no rotation was conducted, and based on the factor loadings some scales were refined.

Subjective international performance was measured with four Likert scale items (1 = disagree totally, 5 = agree totally). A principal component factor analysis was conducted on the items yielding a single factor explaining 80% of the variance (see Appendix 2). The items included in the measure consist of sales, market share, profit-related statements, which are common measures of international and/or export performance (see e.g., Leonidou et al. 2002; Katsikeas et al. 2000). Taking an average of the items formed the final scale for subjective international performance. Internal consistency of the scale was good (Cronbach α 0.91). DOI (which equals in many studies objective international performance) was measured with six items that were combined to a single measure. This measure was obtained by principal component analysis, where all items loaded on a single factor accounting for 64.3% of the variance in the six original items (see Appendix 3).

The measure for experience is formed on the basis of duration of international operations. This measure is often used as a proxy for experience (Erramilli 1991). The descriptive statistics and reliabilities of the final measure scales are presented in Table 2. The generally applied acceptability limit for Cronbach's alpha has the value 0.70 (e.g., Hair et al. 1998). Thus, the measure scales in Table 2 were considered to meet the reliability criteria for the analysis.

Data analysis

Correlations and multiple linear regression were the methods applied to assess the proposed hypotheses. The correlations between the measures are shown in Table 3. Hypothesis H1 concerned the link between experience and functional capabilities. It was tested regarding both experience and the existence of international operations (internationally operating firms—greater capabilities) but it was not supported. This may result from the young age of the firms in the sample. For example, the differences in cumulative experience gained from international operations may not be significant yet, as some firms may still be at the product development stage.

The length of international experience does not seem to enhance capabilities significantly. This may be partly due to the cross-sectional nature of our study as capabilities are seen to evolve over time, or the fact that the usefulness of experience is related to limits to transfer it (see e.g., Knudsen and Madsen 2002).

Multiple linear regression analyses were conducted in order to test the hypotheses. Table 4 gathers the results.

The first four models test the links between international experience and capabilities. The R^2 are very low and the models are not significant, thus H1 fails to receive any support. The second hypothesis predicted a positive effect from international experience on the degree and performance of internationalisation. Table 4 shows that experience has a statistically significant positive effect on DOI (beta=0.429,

Table 2 Descriptive information and reliabilities of applied measures

	Number of observations	Number of items	Mean	Standard deviation	Cronbach's α
Managerial/organisational capabilities (ORCAP)	121	9	3.95	0.55	0.86
Marketing capabilities (MACAP)	121	8	3.56	0.62	0.77
Financial and resources capabilities (FICAP)	121	3	3.47	0.86	0.73
Technical capabilities (TECAP)	120	5	3.94	0.51	0.70
Degree of internationalisation (DOI)	48	6	0.27	1.00	N/A
Subjective international performance (PERF)	54	4	2.57	1.01	0.91
International experience (EXP)	55	1	3.71	3.75	N/A

Table 3 Correlation matrix

	Exp	Ficap	Orcap	Tecap	Macap	Perf	DOI
Exp	1.000						
Ficap	0.095	1.000					
Orcap	-0.158	0.240	1.000				
Tecap	-0.179	0.366	0.463	1.000			
Macap	0.158	0.313	0.481	0.248	1.000		
Perf	0.356	0.213	0.134	0.026	0.162	1.000	
DOI	0.403	0.298	-0.049	-0.039	-0.110	0.499	1.000

$p=0.004$) and also performance (beta=0.366, $p=0.020$), thus H2 is supported and this result is in line with research related to the stages model and KBV.

The R^2 of the regression model for DOI was 0.312, and the model was significant at the level of 0.01. In addition to experience, financial capabilities also have a significant and positive effect supporting H3a, while technical (H3b) or organisational capabilities (H3c) are not significant. A somewhat surprising finding emerges for the role of marketing capabilities (H3d), as there is a significant but negative effect, implying that the marketing capabilities are weaker in firms with a higher degree of internationalisation. The regression model for subjective international performance was not statistically significant and none of the capabilities had any effect. Thus H3 is only partly supported as capabilities are explaining the degree but not the performance of internationalisation. It seems that in the early stages of internationalisation, SMEs' financial planning, networks and even a capability to handle the growth is an important determinant of increased

Table 4 Regression results

Dep.	R^2	Adj. R^2	F	Sig.	Indep.	B	T	Sig
Ficap	0.009	-0.010	0.476	0.493	Exp	0.095	0.690	0.493
Orcap	0.025	0.006	1.326	0.255	Exp	-0.158	-1.152	0.255
Tecap	0.032	0.013	1.714	0.196	Exp	-0.179	-1.309	0.196
Macap	0.025	0.006	1.338	0.253	Exp	0.158	1.157	0.253
DOI	0.312	0.229	3.726	0.007	Exp	0.429	3.098	0.004
					Ficap	0.356	2.461	0.018
					Orcap	0.124	0.753	0.456
					Tecap	-0.069	-0.442	0.661
					Macap	-0.332	-2.117	0.040
Perf.	0.184	0.085	1.850	0.124	Exp	0.366	2.421	0.020
					Ficap	0.159	1.006	0.320
					Orcap	0.188	1.044	0.302
					Tecap	-0.048	-0.284	0.778
					Macap	-0.024	-0.139	0.890

involvement in international markets. Although most of the capabilities are interconnected and often one type of capability is needed to gain another, this result is important as a possible basis for strategic planning.

Discussion, conclusions and managerial implications

This paper has investigated the effect of functional capabilities and experimental internationalisation knowledge on internationalisation strategy measured as DOI and on international performance using the knowledge-based view of the firm as a theoretical perspective. The KBV can be seen as a good point of departure in studying internationalisation of the small- and medium-sized technology-based firms, which operate in an environment characterised by constant changes and rapid development of technologies. We have tried to increase the number of determinants of international performance from the traditional “stages” approach by including marketing, technical, managerial/organisational and financial capabilities in our analysis. In our opinion this kind of approach is suitable for international entrepreneurship domain of literature as Schumpeterian view of entrepreneurship as agents who can create “new combinations” based on existing resources and capabilities is of great importance. The key is the management’s capability to look at existing technologies, markets and business models from different perspectives (see Penrose 1959; Augier and Teece 2007) and these kinds of activities are closely related to entrepreneurship.

Our results confirmed that experimental knowledge related to international operations is a significant determinant of both DOI and international performance. Consequently, these results support the stages model and other advocates of incremental internationalisation. The more interesting question is, however, if the inclusion of capabilities as determinants of internationalisation and international performance is fruitful.

Based on our results, the answer is affirmative, although we have to admit that there are not too many significant linkages between capabilities and internationalisation in our sample as studied capabilities did not explain subjective international performance at all and as technical and managerial capabilities did not explain DOI either. However, financial capabilities of the firm explained DOI. In other words, the increase of the DOI of the firm (in the form of new target markets, new foreign partners and increased export intensity ratio) is enabled by financial capabilities in the form of combination of investment expertise, connections to investors and financial control system). This result is in line with Preece et al. (1999) who found out that although e.g., management attitudes were significant indicators of international intensity the attitudes did not explain the global diversity in their study focusing on young technology-based ventures. Preece et al. (1999) suggested that a key reason for this result is that a shift from international intensity (e.g., exporting to one or a few but limited number of countries) to more diverse global strategy requires more (e.g., resources) than an attitude and desire. In our case, it seems to be that financial resources, acquired because of the possessed financial capabilities may be needed to enable a firm fully utilise its other capabilities, or make potential customers to see them.

Correspondingly, we also suggest that financial capabilities are needed to acquire financial resources with which a firm is able to develop its other important

capabilities. This notion is of importance as in the ‘classic RBV literature’ financial resources have been considered having less meaning as they do not provide sustainable competitive advantage because they do not possess the VRIN attributes (see Lee et al. 2001). However, we should not only measure the financial resources acquired in the form of venture capital investments as in many studies, but also the financial capabilities which may be one threshold to gain and manage these resources efficiently, when the focus is on small technology-based ventures as in our study.

Consequently, excellent investment expertise, connections with venture capitalists and good financial management are important capabilities for a small firm with high growth aspirations. This notion is helpful as well for public policy makers, business incubators, science parks personnel and business angels. The training programmes meant for start-ups should include training related to different financial management skills and provide links to financial institutions. This is naturally of importance as many ICT firms are built around their technological innovation, and other capabilities such as financial management skills are scarce or even non-existent.

Internationalisation is also a challenge for these firms. The negative effect of marketing capabilities on DOI can be explained from this perspective. Partially our marketing capabilities measures focused on strong brand, e.g., “we are known in our market segment” and information gathering regarding e.g., development of market trends. For a SME these types of activities are naturally easier if a firm follows market concentration strategy with less target markets and customers. Furthermore, as McDougall and Oviatt (1996) explain, the marketing and management competencies and skills that provide the exporting SME with competitive advantage in its domestic and current international markets may not be the same as those that create advantage in new international target markets. As an outcome for this, when a firm expands internationally, it must learn how to change and adapt their export or internationalisation strategies “to be congruent with their new environment” (McDougall and Oviatt 1996, p. 27). From the public policy perspective there is also a need to provide international marketing training for firms of this kind to overcome these hurdles.

There are several issues in our sample that can be considered as limitations. Firstly, we have only studied young and small information and communication technology firms. For many small firms, there are resource limitations (mainly financial but also others) in using some internationalisation strategies, although the firms might see themselves as capable of applying them. Secondly, when predicting growth strategy and development of capabilities and experience, it would be better to use longitudinal research design. Although we have no reason to believe that there are validity or reliability problems, the quality of our work would increase in a longitudinal setting. Thirdly, the single industry survey formed a rather homogenous sample with little variations in some variables and a cross-industrial setting would be of interest. For example, as our sample consisted mostly of software firms it is important to point out that in many cases the market needs are global. It may be that the use of rapid growth strategies, e.g., born global approach in internationalisation strategy could give a firm edge over its similar-sized and equally capable rivals. Furthermore, the single technology-based industry may also explain the non-significant effect of technical capabilities on internationalisation. It may be that although technical capabilities can be seen as a basic requirement for existence of the

firms, the actual internationalisation and performance may derive from other capabilities such as financial capabilities to a greater extent.

Fourthly, our capabilities measures did not especially focus on international marketing capabilities, for example, but on marketing capabilities of the firm in general. Here one possible development is to study both international marketing capabilities and domestic marketing capabilities (for similar thoughts regarding market orientation see e.g., Cadogan et al. 2009). Related to this further research should also discuss the issue why perceived capabilities did not differ between the more internationally experienced and domestically operating firms within our sample. This result needs more research, both conceptual and empirical. We could suggest that this relates also to the global mindset and international entrepreneurial orientation (IEO, see e.g., Knight 2001) as well as to the homogenous sample discussed already above. Although we have in simple terms measured the international experience of the managers through the firm level experience, IEO may indeed be a more valid indicator of the internationalisation strategy than experience and knowledge regarding a specific market in a small firm setting. This is something which could be elaborated further in future studies in parallel with firm capabilities. In some studies IEO (see e.g., McDougall et al. 1994; Autio et al. 2000; Knight 2001; Kuivalainen et al. 2004) is seen as an antecedent which may explain the growth strategy choice (e.g., the utilisation of a born global strategy) and performance differences within small firms. Favourable management attitudes are likely to lead to greater commitment in international markets (see e.g., Gencturk et al. 1995).

Also more research is needed in the area of the KBV in the international setting. Even after a long period of conceptual work, there are still only a few studies that focus on the relationships between capabilities and the firm's internationalisation. For example, there are no existing common scales for knowledge-based measures. New scales are needed e.g., in the area of networking capabilities, i.e., what are the antecedents of successful co-operation in an international value network of the firm (Ritter 1999 and Ritter and Gemünden 2004 being some exceptions but focusing not especially on international settings). This is of importance, as networking and use of partners is seen as a prominent and fast way to conduct international business operations in current turbulent market environment. However, only a few studies have investigated this as particular circumstances regarding channel choices of small knowledge-intensive firms have often been overlooked in the literature (see e.g., McNaughton 1996). Future research should also aim at increasing our knowledge regarding rapid internationalisation of small firms in general. There is a need to deepen our understanding of knowledge-based capabilities, which enable small firms to overcome the liability of the newness and other entry barriers. The transfer of knowledge from the entrepreneur/manager to the other KBV members of the organisation/network involved in rapid internationalisation is also a question which should be addressed in a more detailed manner in the future. Based on our results, here the more detailed incorporation of venture capital firms' added value could prove fruitful (cf. e.g., Lockett et al. 2008 regarding export intensity of venture capital backed companies). In summary, however, although there are limitations in our work, we believe that this research has contributed to our knowledge of the capabilities' effect on the internationalisation of small knowledge-intensive technology-based firms.

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Appendix 1

Table 5 Factor structure of core organisational capabilities

Marketing capabilities		
	1	
We have good and firm client relationships.	0.520	
Our marketing expertise can be utilised for many different types of products/services.	0.464	
Our target market expertise can be utilised by other firms.	0.465	
We have a special understanding of the industry.	0.553	
We have good connections to players in the industry (for example, retailers, suppliers etc.).	0.726	
Our clients value our good service.	0.604	
We have a strong brand.	0.631	
We are known in our own market segment.	0.602	
We acquire a lot of information on the development trends in the market (related to, for instance, legislation, the economy etc.).	0.565	
Eigenvalue	3.97	
% of variance	22.03	
Technical capabilities		
	1	
We master the technology we use well.	0.643	
Our technical expertise is better.	0.660	
We master the development of new technologies better.	0.707	
We have a clear vision of how technology will develop in the future	0.576	
Our special expertise can be adapted to new technologies.	0.454	
Eigenvalue	2.45	
% of variance	19.15	
Management (organisational) and financial capabilities		
	1	2
Our staff is skilful.	0.717	
Our organisational structure functions well.	0.745	
Our different functions are well co-ordinated with one another.	0.751	
Strategic planning is our strong force.	0.626	
We have succeeded in our recruitment.	0.663	
We enjoy an encouraging atmosphere.	0.765	
Our resource management has become more efficient through experience.	0.522	
We have a learning organisation.	0.663	
We can utilise the expertise of our staff in different tasks.	0.595	
We have excellent investment expertise.		0.795
We have good connections to different investors.		0.835
We constantly follow the company's financial condition.		0.484
Eigenvalue	5.31	27.96
% of variance	2.11	11.05

Appendix 2

Table 6 Factor structure of subjective international performance

Item	Loading
We have met our international market share objectives	0.936
We have achieved the turnover objectives we set for internationalisation	0.946
In general, we are satisfied with our success in the international markets	0.928
Internationalisation has had a positive effect on our firm's profitability	0.757
Eigenvalue	3.21
% of variance	80.1
Cronbach alpha for mean scale	0.91 (4 items)

Appendix 3

Table 7 Factor structure of degree of internationalisation (DOI)

Item	Loading
Estimated share of turnover from international markets in 2002	0.945
Estimated share of turnover from international markets in 2003	0.881
Percentage of foreign customers	0.830
How many % of your turnover comes from foreign markets	0.808
In how many countries, in addition to Finland, does your firm operate / have clients	0.676
Share of foreign partners	0.622
Eigenvalue	3.86
% of variance	64.3 (6 items)

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